

Inflation Targeting in the US

Should the US Congress amend the Federal Reserve Act and make price stability the primary goal of monetary policy?

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1 Introduction

We strongly recommend that the Congress of the USA amends the Federal Reserves Act to make stable long-term inflation the primary objective of monetary policy. We argue that by making inflation targeting explicit, the Fed will be more efficient with its monetary policy and better prepared to handle the macroeconomic challenges of the future.

For Laurence H. Meyer, “the most obvious obstacle to establishing an explicit numerical target for inflation [was], of course, Alan Greenspan”(Meyer 2004). With Greenspan gone, a supporter of inflation targeting as the new Chairman of the Fed and right after a major shift in the macro-economic situation, it is a good time to consider the question: should the Fed become an explicit inflation targeter?

The discussion of whether inflation targeting is the appropriate regime for the Fed is not a new one. While much has been published in favor and against this idea, it has never found sufficient political support. Attempts to change the Fed’s mandate have been recurring. Most recently in 2009, the “Price Stability Act of 2009” was submitted to congress under the sponsorship of Republican Congressman Paul Ryan. The bill was referred to the Committee on Financial Services and the Committees on Education and Labor. No further actions have been taken up to the point of writing. Similar initiatives were taken in 2005 and 1999 (Joint Economic Committee, 2004). None of the proposals has been successful, but their frequency indicates that the current mandate of the Fed is not entirely satisfactory. What these tentative have in common is the attempt to repeal the Hawkins-Full Employment Act and establish price stability as the primary long-term goal of the Federal Reserve.

Historically, the US has experienced periods of high and volatile inflation. Looking at annual CPI rates, especially in the period from the late 1960’s to 81, we see inflation fluctuating between 3% and 13.3%. The same data shows that in recent years the management of inflation has been exemplary. Indeed, during the last 20 years, we have witnessed historically unique low and stable inflation levels. As price stability seems to have been achieved, the question of why inflation targeting is necessary clearly justified. In order to present the reasons why inflation targeting is the right choice for the US, we will proceed as follows: In a first part we explain why the current mandate of the Fed can potentially lead to suboptimal monetary policy. With these weaknesses in mind, we will present the main arguments in favor and against inflation targeting in sections 2 and 3. In the fourth section we will present the most important empirical evidence before we discuss in the last section the way in which inflation targeting would have to be implemented.

2 What is wrong with the current regime?

In order to evaluate the merits of inflation targeting, a benchmark situation can be very helpful. The most obvious choice for such a comparison is the current mandate. In this section we will look at the Fed’s mandate and some of the characteristics of monetary policy in general. By doing this, we will not only provide the elements

needed for the comparison, but also show why the present situation is far from satisfactory. Currently, the Fed has a dual, or rather triple mandate. The Federal Reserve Act stipulates that “the Board of Governors of the Federal Reserve System [shall influence the money and credit supply] so as to promote effectively the goals of maximum employment, stable prices, and moderate long-term interest rates”, a formulation which was largely influenced by the Full Employment and Balanced Growth Act of 1978. While moderate long-term interest rates are commonly not considered equally relevant, the other two goals are undoubtedly of crucial importance.¹ Thus, we normally refer to the “dual mandate” of the Fed.

2.1 One instrument for two contradictory objectives

The first problem with the dual mandate is that the Fed has, in practice, merely one instrument to reach two objectives (Lalonde & Parent 2006). Through their monetary policy tools (open market operations, discount rates and reserve requirements) the Fed can influence the overnight inter-bank lending rate and indirectly the short and long-term nominal interest rates that apply to all the economic actors. Interest rates affect the cost of borrowing and hence real economic activity. Assuming flexible prices, the mentioned change in economic activity will affect the general price level and hence inflation. An increasing demand for the factors of production, will raise factor prices, which will lead to higher retail prices and inflation. Hence, the Fed has one tool that has repercussions on both of its objectives.

However, not only are the two objectives simultaneously influenced by the interest rate, they also tend to go in opposite directions. In the standard macro models (IS-LM, Samuelson overshooting...) inflation is positively correlated with economic activity. An increase in inflation (bad) tends to go along with an increase in economic activity and a fall in unemployment (good). This constitutes a conceptual problem: we have a single instrument to attain two potentially contradictory objectives. The Phillips curve depicts exactly this negative relation between inflation and unemployment, assuming rigid prices in the short run, it implies that inflation can temporarily help to reduce unemployment while disinflation will increase unemployment. What the Phillips curve shows is that in the short run low inflation and full employment are in principle contradictory goals. Clearly, the Fed has to strike a balance between the two objectives.

2.2 Contradiction over time

In an economic upswing, price rigidities usually are weak and wages and prices adapt as the economy overheats. Hence, any effect of monetary policy is bound to be temporary. If economic actors expect the same inflation rate to continue, the effects of a one period increase in inflation will be lost in the long run. In rational expectations models (Kydland and Prescott 1977, Barro and Gordon 1983), agents will adjust their inflation expectations, and hence entirely offset the effect of the

¹ The fact that high unemployment is not desirable is self-evident. The optimal employment level can hence reasonably be assumed to be full employment. What the optimal level of inflation is, is less clear and subject to a discussion on its own. Without trying to strike a balance and propose a point estimate, we refer to the obvious costs of high inflation and refer to the standard arguments that are brought against inflation (increased uncertainty, transaction costs, shoe leather cost, menu costs...). For more technical analyses we refer to traditional work such as Fischer (1981) and Cooley and Hansen (1989).

increased inflation. Unemployment will return to its natural level and, in the long run, expansionary monetary policy will only lead to high inflation without any lasting benefits regarding unemployment. As a result of this mechanism, the trade-off between inflation and unemployment disappears in the long run. Monetary policy hence is not suited to determine the level of real economic variables such as output and unemployment.

Both the theory and empirical evidence suggest clearly that monetary policy is badly suited to affect long run levels of economic variables. However, while the ability to affect the level might be out of reach, monetary policy can affect the volatility these variables. Some sort of Philips curve exists in the short run and monetary policy may help absorb shocks or at least dilute their effect over time. In this sense, monetary policy can be used to smooth business cycles. We have argued before that - especially in the case of a supply shock - output and inflation are pushed in opposite directions and the trade-off between the two objectives becomes a problem. If we assume now that the economy is subject to recurring shocks, the central bank can choose the extent to which, monetary policy should be used to absorb their effect. Stabilizing the level of economic output does not come without a cost, however. In fact, smoothing output and unemployment can induce higher variability in the level of inflation. In his seminal paper, Taylor (1979) found that a high variability of inflation is negatively correlated to a high variability of output. In other words, smoothing the business cycle of an economy that is subject to exogenous shocks can only be attained by accepting an increase in the volatility of inflation. Alternatively: stabilizing inflation is possible only by accepting a higher degree of unemployment variability. So, be it in the short or in the long run, the two objectives are contradictory.

Until now, we have looked at the two objectives in a static way. In the next paragraph we will change this and take a closer look at inflation dynamics. By doing this, we will discover that using monetary policy to smooth the business cycle can be dangerous if the public's inflation expectations adapt.

2.3. Time inconsistency and the Central Bank's inflation bias

Taylor's contribution to macro-economic theory can be placed in the broader context of the "rational expectations revolution" (Galí & Gertler 2007), which has introduced the importance of the public sector's expectation for the efficiency of monetary policy. Private households build forward-looking expectations, which impact on their long-term decision-making.

Taking a traditional New-Keynesian loss function for the central bank (see Kydland and Prescott (1977) or Barro and Gordon (1983)), we find that, while the public minimizes its loss function by equalizing the effective and the expected inflation, the central bank has an incentive to surprise the public in order to stimulate employment above its natural level. The bank will hence set inflation always a little bit higher than the public's expectations in the previous period. Unfortunately, the public will react by increasing their expectations in the next period. In fact, conscious of the central banker's incentive, the public will not only set their expectations at a higher level, but also make them more sensitive to bad news.

To get the same result as before, the central banker will have to set the level of

inflation again higher than the public's expectations. Since these expectations have increased and might have become more sensitive, the realized inflation will be higher than the period before. Repeating this interaction between realized and expected inflation, we get an accelerating spiral and inflation levels above what was perceived as optimal initially. If this spiral continues, inflation will shoot through the roof. While the costs of inflation are rather small at low levels, once the inflation has two or more digits, they become very significant. As an inflation spiral can have disastrous effects on the economy, the extent to which monetary policy should be used to smooth business cycle is limited. An initial expansion must be followed by a very credible contraction at a later point. As we will see in the following paragraph, switching from loose to strict monetary policy can be very costly, specially when the it undermines the credibility of the central bank for low inflation.

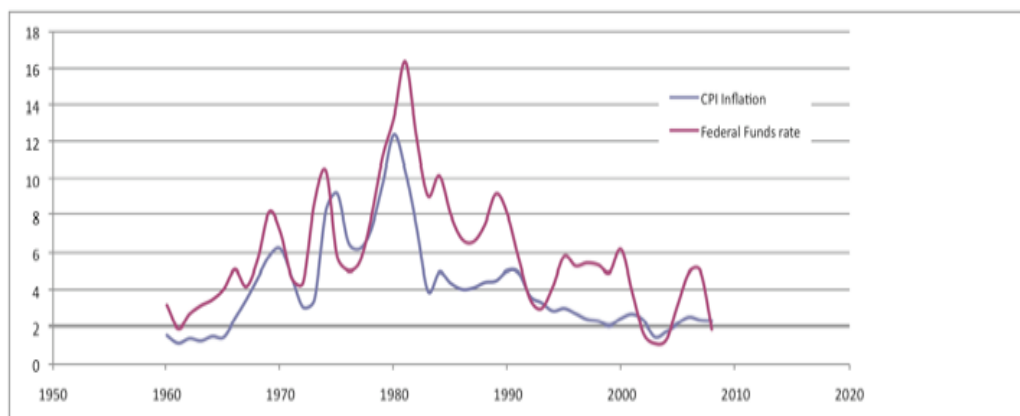
2.4 Regime Switching is costly

The process of switching between high and low inflation periods has been referred to as "regime switching" (Andolfatto & Gomme 1999). Switching from a high to a low inflation period means that the central bank radically shifts the weights it attributes to inflation and the output gap. There are historical and theoretical reasons that suggest why such switches have a negative impact on the loss function of the central bank. If one argues that price rigidities in the upswing are weaker than in the downswing, then the adaptation of prices takes longer when switching to a low inflation regime, and the resulting discrepancy between wages and price level will lead to unemployment.

A similar argument can be made if inflation expectations are more elastic upwards than downwards. A standard way of modelling expectations is based on the past forecasting error, meaning by how much the expectation forecast of last period was wrong. It makes intuitive sense that inflation expectations react more radically if the effective inflation is above past expectations than below. Also, in this situation the discrepancy between real and expected inflation would have to persist over a longer period and the cost, with regard to unemployment, would be bigger. Both arguments indicate that the costs of disinflation will exceed the benefits attained by the previous inflation. Volatility in inflation will hence damage real economic performance.

Regime switching was common in the 1970s. As the Fed wanted to show that it was responsive to public concerns about both parameters, the weight accorded to inflation and unemployment depended on which appeared more worrying to the public. Goodfriend called this behavior "go-stop-policy". A period of loose monetary policy brought down unemployment. Once the undesired side product - high inflation – became the main concern of the public, the Fed tightened the money supply. This "stop" allowed to curb inflation but led to soaring unemployment. A couple of such "go-stop" cycles left the credibility of the Fed in shatters, which made it increasingly difficult to influence the inflation expectations of the public. The positive effects on the real economy of increases in inflation became hence ever more short-lived. The way out of this period of high and volatile inflation was a relatively painful disinflation initiated by Volker in 1979. Goodfriend argues that the sharp increase of the interest rates, which reached levels close to 20%, were at least partially responsible for the recessions in 1980 and 1981-1982 (Goodfriend 2003).

Figure 1- The Evolution of inflation and the federal funds rate over time



Source: National Bureau of Labor Statistics

2.5 The key to low inflation is well-anchored expectations

The credibility of the central bank is one of the most crucial concepts in order to understand the discussion on inflation targeting. We have argued before that inflation above expected inflation would raise expected inflation for the next period. The speed and extent to which the expectations adapt are largely influenced by how credibly the central bank can commit to stable and low inflation in the future. The credibility of the Fed will hence logically depend on how well the public is able to understand and predict its behavior. If the prioritization of the objectives is unknown, certainty is low and small shock can lead to relatively big increases in the expected inflation which will make it harder for the central bank to optimize its loss function. In other words, the lower the credibility of the central bank, the higher is the elasticity of the inflation expectations with respect to a signal that could forebear higher inflation. Under such high elasticity, any signal could cause a significant shift in the expectations. Orphanides and Williams (2003) have argued that, since private agents have imperfect information, such a situation can potentially lead to inflation scares in which the expected inflation surges far above what rationally should be expected under perfect foresight. In such a situation, maintaining credibility and holding inflation stable would imply a significant cost in terms of real economic variables.

2.6 Loose anchor

The scenario of highly volatile inflation expectations might seem unrealistic, given that the credibility of the Fed is currently very high. Inflation has been kept low and stable and, at least until very recently, the public would not have expected any significant changes in the inflation rate. This success story is partially due to the Fed's policies, which some economists have described as "implicit inflation targeting" (Bernanke 2003, Goodfriend 2003). They argue that the Fed, while not publicly announcing an inflation target, has shown most of the behaviors that are normally identified with inflation targeters. These include pre-emptive action against inflation, an effort to increase transparency through a very conscious communication strategy and the enjoyment of a robust credibility and hence rigid expectations of the public. However, as the inflation target is not explicit, the inflation anchor is not a number or

a numerical range. It is merely the public's confidence that the institution, or its Chairman, will keep the inflation "low". "Low" inflation, however, is a vague anchor, which might provide sufficient credibility only as long as the macro-economic situation is sunny and stable, as it was the case before the recent crisis. In times when the confidence in the economic stability is dampened and the liquidity in the market is high, such an imprecise inflation target might not be good enough to peg the public's expectations (Schwartz and Todd 2009).

In the above paragraphs, we have provided some of the elements that help us understand, why the Fed's current regime is not satisfactory. While it has worked in the last 20 years due to good policies and favorable macroeconomic conditions, history tells us that even central banks are not immune to mistakes and that once inflation becomes more volatile, returning to low and stable inflation can imply a substantial period of reduced growth and unemployment above the natural rate. We will now show why long term inflation targeting - the announcing of an explicit inflation target over a given time horizon – can lead to a superior solution.

3 The arguments for explicit inflation targeting

In the literature, the arguments in favor of inflation targeting are numerous. They can be divided into two big categories. One is based on economic rationale and while the other follows more political considerations: inflation targeting makes monetary policy more efficient and it makes it more democratic.

3.1 Monetary policy becomes more efficient

Whether and to what extent, monetary policy can influence real variables, and hence sensibly smooth a shock to the real economy, has been the subject of considerable discussion. Without trying to strike a final decision, we have argued that changes in the nominal interest can affect unemployment in the short run.

Closely in line with what we have explained in the previous section, we argue in the following paragraphs that monetary policy becomes more efficient with inflation targeting. The logic is the following: having a numerical target over a given time horizon allows the Fed to better manage the public's expectations. The more precise the Fed's objective the less room it leaves for interpretation. Consequently, policy action can be better targeted; the smoothing of an output shock does not imply the same cost in terms of inflation while the reduction of inflation leaves output less affected.

Let us look a little more closely at the benefits of IT in the presence of different shocks. Given a demand shock the goals of low inflation and full employment are mutually reinforcing. Even in this case, where there's no trade-off between the two goals, it is important for the effectiveness of the monetary policy that the Central Bank has a strong and credible nominal anchor. The lack of this, can lead to volatility in expectations and undermine one of the main channels through which monetary policy works. The mechanism is the following: if the central bank, for instance, decreases interest rates and the public believes this will lead to inflation because expectations are not well anchored, people will ask for higher long term interest rates

to offset the effects of inflation. This mechanism will thus decrease the effectiveness of the expansionary policy. If, however, expectations are well anchored, the reduction of the interest rates will not lead to the same increases in expected inflation. Inflation scare are less likely and the same monetary policy (in this case the reduction of the interest rates) will have a larger effect on output.

In the case of supply shocks, where output and inflation go in opposite directions, a strong commitment to price stability can also be beneficial. This is because supply shocks are often temporary, and thus, if expectations are well anchored, the central bank does not have to raise interest rates too aggressively to avoid surges in inflation. In other words, knowing that the central bank will keep inflation at the targeted level in the long run, the public will not react as quickly in terms of prices and wage demands. A given increase in input prices (oil prices for example) will hence have a lower pass through to wages and output prices. This can help weather the downturn. Mishkin (2008) claims that the outcomes of the oil shocks of the 70's compared to those of the recent increases in energy prices is an demonstration of this mechanism: a stronger commitment to stable prices reduces the effect of a supply shock on the real economy. As we have argued above, the commitment can be further increased by giving the public unmistakable information about what the level of inflation will be; hence by making inflation targeting explicit.

3.2 Monetary policy becomes more democratic

The second argument in favor of inflation targeting is a political argument, which is based on a modification of the relation between Congress and the Fed. By giving the central bank a numerical target, its performance can actually be measured and evaluated. It thus becomes possible to hold the central bank accountable for its action. Inflation targeting hence makes the monetary policy more democratic.

The goals of the Federal Reserve have always been set by the Congress. They are stated in the section 2A of the Federal Reserve Act. However, given the multiple - and as we have seen before – sometimes contradictory nature of the objectives, three problems arise.

First, at least marginally, the Fed can decide itself which objective it wants to pursue. The weights accorded to inflation and employment are subject to discretion. In other words, the Fed is basically free to choose not only the instruments but also the precise composition of the objective. Whether this is excessive power is possibly a subjective question, but let's be clear: this does not correspond to the standard way of how appointed officials are given their mandate.²

Secondly, the discrete selection of the precise objective is done with little exchange between the Fed and the public. In fact, given the tendency of the central bank to surprise the public with higher than expected inflation, the Fed might purposefully create opaqueness. While the right to know of the citizen has its limits in a democracy when it comes to highly classified information, this rationale does not apply to monetary policy. In this case, citizens are not entirely informed in a matter

² The seven Governors of the Federal Reserve System as well as the Chairman and the Vice-Chairman are appointed by the President and confirmed by the Senate. A Governor can serve only one term, which however has a duration of 14 years. (For more information see "The Federal Reserve System: Purposes & Functions" <http://www.federalreserve.gov/pf/pf.htm>)

that can result in negative externalities for them. It is hence understandable that the national security or the police do not disclose all their activities. It is however far from clear that this should apply to monetary policy. In fact, in a democracy where the public is the main stakeholder it should have the right to ask for transparency in monetary policy.

The third problem is that evaluating the Fed's performance is extremely difficult. Not only can the objectives be contradictory, but also is there no benchmark against which each objective can be evaluated. Is 3% inflation a good performance? It is hard to say, as it obviously depends on the situation and the challenges the central bank is confronted with. However, if the Fed were to have an explicit target range, the comparison between the targeted and the effective rate of inflation can easily be made and hence, the performance of the Fed can be evaluated. The Fed would thus become subject to the same checks and balances that are present in other parts of the American institutional system. Such accountability is good from a political point of view as it corresponds to the underlying and philosophical principles of a modern democracy. Accountability can also have positive effects on the way monetary policy is conducted. It gives the Fed a clear goal, over which members of the FOMC no longer need to argue and which is no longer subject to political pressure. Compared to the current vagueness of the dual mandate there will be less room for political pressure to have an influence on the decisions of the Fed. Especially in times of turbulence, the Fed will be less likely to be influenced from popular worries over inflation or unemployment. Given the experience from the 70s, we know that this will help the Fed to maintain stable macroeconomic environment.

In sum, inflation targeting would simultaneously make the Fed more democratic, more accountable and more efficient. Nevertheless, many people familiar with the issue are not convinced and argue that inflation targeting is not well suited for the US.

4. Arguments against the adoption of Inflation Targeting

The following paragraph will present the most prominent arguments stated against the adoption of inflation targeting. We will discuss the counterarguments potentially relevant to the United States, since some counterarguments in the literature apply mainly to emerging market countries.

4.1 Lack of flexibility

The first counterargument critics of inflation targeting propose is the potential lack of flexibility that supposedly would accompany its introduction. If the central bank only focuses on inflation, the real economy would have to absorb any given shock in its entirety. Inflation targeting hence protects the people holding capital to the detriment of workers.

Does the announcement of an explicit numerical inflation target force policy makers to be too mechanical? Will the Fed lose its flexibility to respond differently to different economic disturbances as for example supply and demand shocks, or shocks to financial markets or institutions. Donald Kohn (2003) argues that "[T]he success of

U.S. Monetary policy has in large part derived from its ability to adapt to changing conditions - a flexibility that likely has benefited from the absence of an inflation target". Greenspan (1996) feared that inflation targeting could fence the Fed in if nonmonetary forces become inflationary. The achievement of an explicit target could then require an unemployment rate above a socially acceptable level. Opponents stress that the pressure to hit an inflation target exhibits an additional constraint. The above stated arguments, however, are based on a too rigid type of inflation targeting known as "strict inflation targeting". Under this definition, a central bank's only concern, even with short horizons, is inflation stabilization. This definition is however a very theoretical one. It corresponds to a regime that is not implemented by any central bank today. The form of flexible inflation targeting we suggest, preserves the Fed's flexibility and actually strengthens it through the setting of a nominal anchor and thus stabilised inflation expectations.

How flexibility is affected hence depends crucially on how it is understood by the Economic Council, the US Congress and the public. Nothing is gained by being unclear and vague about its objectives. Inflation targeting, according to our definition, provides a flexible framework with respect to the time frame, in which the target will be achieved depending on the type and persistence of shocks. Svensson (1997) argues against a too short-horizon and discuss how the speed of convergence back to the desired target of inflation after a disturbance depends on the weight put on inflation compared to deviations of other variables, like employment.

The argument that inflation targeting will keep inflation stable but increases output volatility is hence not supported by the most practical definition of inflation targeting. As we shall see in detail later, also the empirical evidence is against this argument. Studies by Mishkin and Schmidt-Hebbel (2006), Creel and Hubert (2003) and Ball and Sheridan (2003) discover that inflation targeting not only reduces long-term inflation levels but -more importantly- output and interest rate volatility, too. This, as well as lower interest rate levels, underlines a gain in flexibility rather than a loss.

A further concern regards real variables like exchange rates and asset prices, which might be neglected under inflation targeting. The exchange rate, however, is an endogenous variable and should thus not be explicitly targeted, its actual or expected value however are not being entirely ignored under extreme circumstances. Even though it is reasonable to ask whether exchange rate considerations strengthen or weaken the case for inflation targeting. Low and stable inflation is likely to support a stable purchasing power of the dollar. Most empirical macroeconomic models suggest little or no net impact on US external balances in nominal or real terms in the case of inflation targeting.

Generally, the credibility and accountability gained by targeting inflation in the long run will be beneficial to stabilizing real variables. Inflation targeting is far from a rigid approach neglecting real economic variables, but it rather leads to gains like additional flexibility for adjustment as well as reduced output volatility through the anchoring of expectations.

4.2 "If it ain't broke, it don't need to be fixed"

The performance of the American under the current regime is the basis for the

second main argument for not abandoning the dual mandate. The Fed has been performing great recently, so why should we change? This could be an effective argument if the consequences of adopting inflation targeting would be unknown or large. Experience in other countries, however, indicates that risks for the US in case it decided to adopt inflation targeting would be very small. Price stability has been a legislated long-term goal of the Federal Reserve since 1977 and the success of the 1980s and 1990s has notably contributed to public understanding and support of low inflation. During recent decades, especially since the appointment of Greenspan as Fed's chairman in 1987 the US has experienced low and stable inflation in line with growing output. Policy in his era was conducted in a flexible but disciplined way. This flexibility under the 'just do it' approach questions a need for change.

Alan Greenspan 'discretion rather than rules' policy was successful and hence demonstrates a better framework for opponents of inflation targeting. Alan Greenspan himself opposed inflation targeting. Each chairman, however, is likely to prefer the status quo as long as he is in term. The felicitous nonmonetary factors witnessed by the US during the 1990s are likely to have substantially contributed to Greenspan's performance. World wide political support for stable prices and globalization fostering competition as well as an acceleration of productivity produced a downward pressure on costs and prices. According to Kohn (2005) the level and stability of core PCE inflation since 1997 can be seen as much as a consequence of unexpected favorable developments, as of deliberate policy. During this era, credibility and low inflation served predictability and well anchored expectations without setting an explicit numerical target for inflation. However, this might have been partially driven by nonmonetary factors during this specific time, allowing US policy to perform particularly well. To protract this the well-anchored expectations in the present and future, inflation targeting might be the best framework.

4.3 Reduced Independence

The third argument against explicit inflation targeting is a feared loss of the central banks independence. Buiter (2006) for example argues that the operational independence of the European Central Bank can be impaired by inflation targeting (Buiter 2006). One would be tempted to think that if we let the congress intervene more actively in the activities of the Fed, it might be more exposed to political pressure.

Some argue that by amending the Federal Reserve act to further specify the Fed's objectives, the Congress is attacking its independence and creating a dangerous precedent of congressional meddling. This worry rest on the view that the Fed is composed of benevolent specialists, with the sole goal to conduct the best monetary regime possible, while the Congress is more guided by temporary political interests. This is the typical argument for the independence of any central bank and we completely agree on the importance of the Fed's independence. An independent Central Bank is an absolutely crucial element of the institutional framework that best promotes macro-economic stability. Inflation targeting would not be a reasonable policy regime, if the central bank's independence were undermined.

Blinder argues that independence refers to two aspects. First, the Fed has discretion over the selection of the tools it employs and second, a decision of the Fed cannot be overturned (Blinder 1996). It is important to notice that having discretion of the their

objectives, is not part of the Fed's independence. In fact, the mandate of the Fed has always been defined by the Congress. Although inflation targeting would make the objective more concrete, there is nothing fundamentally new to this aspect.

What changes with inflation targeting, is that the Fed would – not only formally but also practically - become accountable to the Congress. It would give the Fed clear and measurable objectives, which allows the assessment of their performance. However, it would also leave the Fed the freedom to choose the instruments that the FOMC perceives as optimal. The definition of the target is done ex-ante while the assessment of the Fed's performance would be done ex-post. During the decision making process, the Fed would not have to consult the Congress. There is hence no mean, how a decision of the Fed could be overturned.

Both aspects of the central bank's independence are hence still fulfilled. Inflation targeting will thus not impair the Fed's independence and the independence argument therefore is not relevant for the Fed. As we have argued in the previous section, inflation targeting could actually insulate the Fed from public pressure. Arguments for monetary interventionism would be less effective and the above mentioned inflation bias would be weakened thanks to the strong and transparent commitment to price stability. We are hence convinced that inflation targeting would strengthen and not weaken the Fed's independence. In any case, the Federal Reserve, although independent of temporary political whims, is still a Federal unit and answers to the democratically elected U.S. Congress.

Many arguments against inflation targeting can be brought up. In this part we have tried to summarize the ones that are most commonly cited. However, none of them is sufficiently convincing. We have come to this conclusion by making reference to some empirical papers that either support or refute the discussed arguments. In the following section we would like to increase the focus on empirical evidence to find out whether the experience from other countries supports our recommendation.

5. An Assessment of the Empirical Evidence

Although our support for the adoption of a single mandate for the United States is mainly founded in strong theoretical arguments, our analysis would not be complete without a reference to the copious empirical evidence produced so far about inflation targeting. We must admit that this evidence is not entirely conclusive, and this is due to several reasons. First of all, inflation targeting is a relatively recent framework and thus the period of analysis is quite short. Secondly, an econometric assessment of the performance of inflation targeters in comparison to non-inflation targeters is subject to many problems. One of these is, naturally, endogeneity. It can be easily argued that countries that adopt inflation targeting are those in search of a framework that can allow them to reduce their inflation and thus probably subject to high inflation (although findings by Hu 2003 seem to refute this claim). Moreover, in this type of analysis a counterfactual is particularly difficult to construct. The comparison between targeters and non-targeters is made difficult not only by the fact that these countries are different in many aspects, but also by the fact that at least a few of the so called non-targeters actually employ some form of inflation targeting, however implicit it may be. Among these are, for example the ECB and the subject of our paper, the Fed (Truman 2003, Goodfriend 2003). The former in particular, although it refuses to be

branded as an inflation targeter, has price stability as its primary goal and a numerical target for inflation, which, by most definitions, make it an inflation targeter. Notwithstanding all the aforementioned problems, many economists have attempted to evaluate the outcomes of the adoption of inflation targeting. In many cases these results have implications for countries like the United States. The empirical analysis thus offers some useful insights for our analysis.

Mishkin (2008) deals with a very general question: does stabilizing inflation help stabilize output? This question is closely related to our topic since, as we shall see, there is substantial evidence that IT is an effective way to stabilize inflation. If the answer to Mishkin's question is affirmative (and we have argued before that it is), then IT might contribute also to reduce volatility in output. As we shall see below, there is substantial empirical support also for this argument. This is a result, which undermines one of the principal arguments of the detractors of the single mandate. Going back to the paper, Mishkin surveys recent empirical research and argues that this points to the fact that the trade-off between inflation and output might not be as severe as previously believed, and that, therefore, the way to most effectively stabilize both prices and output would be to aim for stable and low inflation. This argument is connected to the fundamental idea that the effectiveness of monetary policy depends crucially on the ability of a Central Bank to manage the public's expectations (see for example Gali and Gertler 2006), which is one of the theoretical foundations of IT.

Let us now look at the main paper that advocates the lack of evidence for the benefits of IT. Ball and Sheridan (2003) analyze the performance of inflation targeters through time and, at the same time, in relation to non-targeters. The authors find that both targeters and non-targeters reduced their inflation levels and improved their overall macroeconomic performance. Targeters are, in general, found to have improved by more. Ball and Sheridan ascribe this result to a reversion to the mean of inflation in these countries, since, they claim, those that took up inflation targeting had a worse inflation record and thus reversed to the mean quicker. The authors, thus, argue that once the reversion to the mean and the trend effects are taken in consideration, IT provided no visible benefits to countries that adopted it. The foundation of this argument is, however, questionable, while Gonçalves and Carvalho (2009) find that countries with higher inflation are more likely to adopt the regime, Hu (2003) concludes that the level of inflation is negatively correlated with the choice of adopting inflation targeting. Ball and Sheridan's paper has also been heavily criticized on the econometrical level due to the poor robustness of its findings (see Mishkin and Schmidt-Hebbel 2006). We have some further objections that regard the theoretical level. Our criticism arises from the doubt that the concept of mean reversion makes sense when dealing with inflation. In our opinion there is no apparent reasons why inflation should return automatically to a certain level. Our understanding is that inflation is a result of policies, expectations and shocks. It is a pretty well established fact that high levels of inflation lead to more volatility and can possibly result in episodes of hyperinflation. Thus, the fact that countries that adopted IT managed to significantly reduce the levels and volatility of inflation should be considered a success of IT.

Laubach and Posen (1997) propose an interesting way to test the effectiveness of inflation targeting. They compare countries that have adopted explicit inflation targeting with countries with similar characteristics that have not. To give a sense of

their approach, they pair up the targeters Canada and New Zealand with the non-targeter Australia; the targeters Sweden and UK with the non-targeter Italy and, finally, they compare the economic performance of the targeters to two high performing nominal targeters like Switzerland and Germany. Overall, the authors' conclusion is that inflation targeting has been successful in the task of reducing inflation and then keeping it at or below its target. Inflation levels and expectations dropped more than what would have been expected given the countries' past experiences and position in the business cycle. Also, the rise in short term interest rate necessary to reach this result was lower than that implied by previous experiences.

Creel and Hubert's (2003) analysis is in line with the classic approach of evaluating the performance of targeters by comparing their performance before and after the adoption of IT and by comparing them to non-targeters. The two authors attempt to overcome the control group problem mentioned above by using a MSVAR approach. In their quick review of empirical literature they show how evidence so far has gone in both directions and has been subject to major econometrical problems. The authors assess the performance of IT countries over time as well as comparing them to the US. The results of their analysis are the following: 1) the adoption of inflation targeting does not constitute a change in policy reaction; 2) IT is a recognizable regime that ensures a higher predictability of policy responses. These results appear to be robust to changes of the sample. Like previous studies, with the exception of Gonçalves and Carvalho (2009), Creel and Hubert find that IT does not reduce the sacrifice ratio of disinflation. On the other hand the authors reach the key conclusion, shared also by others, that inflation targeting does not lead to higher output volatility. The theoretical argument that inflation targeting allows for a more flexible response to shocks in the short run, is further supported by the lower interest rates found in IT countries. Neumann and Von Hagen (2002), by comparing inflation targeters to high performing non targeting countries such as Germany, Switzerland and the US, find similar results.

The results of a more recent paper by Mishkin and Schmidt-Hebbel (2006) support the positive assessment of IT found in most of the empirical literature. The authors evaluate the performance of targeters across time and against a group of high performing non-targeters. The additional contribution brought by this paper is the use of alternative control groups, a panel data set and alternative estimation techniques. The authors find, like Creel and Hubert (2003) and Neumann and Von Hagen (2002), that inflation targeting reduces long-term inflation levels and volatility as well as interest rates. At the same time, they find that inflation targeting does not increase output volatility, but in some cases actually decreases it. This regularity found in most empirical studies crucially undermines one of the main counterarguments of IT, namely the one that states that the IT regime excessively ties the hands of the central bank leading to unnecessarily large unemployment and output gaps. Going back to the empirical evidence, the authors also find that IT helps in various aspects: to reduce the response to oil price changes and exchange rate shocks, to strengthen monetary policy independence, to improve monetary policy efficiency, and to obtain inflation outcomes that are closer to target levels. Overall, Mishkin and Schmidt-Hebbel argue that in IT countries expectations seem to be more tightly anchored than in other countries. This translates in a smaller reaction to shocks, especially if longer horizons are taken in consideration.

The authors emphasize the fact that, while inflation targeting surely improves the performance of countries that adopt it, it does not allow them to perform better than high performing non-targeters. This means that IT performs the essential role of providing countries with a nominal anchor for inflation, but that it is not the only way to achieve this. Mishkin and Schmidt-Hebbel claim that Germany's nominal anchor lies (or rather, used to lie) in a strong monetary targeting procedure, while in the case of the US, the nominal anchor was embodied by the former chairman, Alan Greenspan. For this reason, the authors argue, that IT could be a way to assure a continuation of the performance of the Fed once Greenspan, and other members of the FOMC, will be gone. Institutionalizing an inflation target could provide the US with the solid and official nominal anchor that it still lacks. Quoting the authors on the reasons for a possible adoption of IT by industrialized countries like the US:

"First, the strong nominal anchor that produced a successful monetary policy is often based on individuals, and their replacements may not be strongly committed to the nominal anchor. Second, the focus on the long run exhibited by successful nontargeters may weaken in the future. Third, the lack of transparency about the goals of monetary policy increases uncertainty. Fourth, the lack of accountability in the absence of inflation targeting could undermine central bank independence in the future, thereby weakening the nominal anchor. Inflation targeting has the potential to ensure that the successful monetary policy performance of our control group of industrial nontargeters in recent years continues in the future."³

De Carvalho Filho (2010), in a brand new paper, analyzes a different aspect of IT, and namely, its performance in times of crises. The author looks at inflation targeters during the recent crisis and compares them to non-targeters. Naturally, not all the differences in performance can be ascribed to the monetary policy regime, but the results of the study can nonetheless help us understand how a policy like IT can influence the response to a global shock of this magnitude. In fact, the supposed weaknesses of IT, like the shifting away of attention from unemployment and financial stability, could be exacerbated in the context of a crisis (Buiter 2009). As the author points out, however, there are also some good reasons why inflation targeting could bring benefits. The commitment to a certain level of inflation, for example, can help prevent deflation, through the same mechanism, based on expectations, that allows it to contrast inflation. Also, as argued throughout the Memo, the targeting of a medium/long term inflation goal can increase the flexibility and the ability of the CB to intervene in the short run. Furthermore, if IT leads to having higher interest rates during the expansion that precedes a crisis, there could be a counter-cyclical effect, that might help reduce the downside. At the same time, countries that start with higher nominal interest rates have more manoeuvring space before they hit the lower zero bound. In the empirical analysis, de Carvalho Filho finds that IT countries avoided deflation scares better than non-targeters, and, at the same time, managed to reduce interest rates more than non-targeters. The data also supports the idea that, IT countries, managed to weather the crisis better. In particular, industrial IT countries were found to have higher GDP growth than their non-IT counterparts.

³ Mishkin F. & Klaus Schmidt-Hebbel, 2006. "Does Inflation Targeting Make a Difference?," Working Papers Central Bank of Chile 404, Central Bank of Chile, p. 26

Summary

Although the evidence is not entirely conclusive (as empirical evidence in macroeconomics often is), a majority of papers finds that the IT carries many advantages with it. Apart from being a reliable framework for the reduction of inflation levels and inflation volatility, this regime seems to insulate countries from shocks such as changes in the price of energy or movements of the real exchange rate. Thus, Inflation Targeting appears not only to be a high-performing framework for price stability but, thanks to its flexibility and the room for effective short-term intervention it provides, also for the reduction of output volatility. We have furthermore seen how inflation targeting can help countries in the case of a severe global crisis like the one we have recently witnessed. Overall, the empirical evidence thus confirms and supports the idea that the institutionalization of inflation targeting, through the adoption of a single mandate for the Fed, would guarantee the continuance of the high performance witnessed so far and possibly improve it, while increasing the transparency and accountability of the Central Bank's action.

6. Implementation

The decision to abandon the dual mandate and take up inflation targeting must be made by the U.S. Congress. Under the U.S. Constitution, monetary policy is a responsibility of the Congress and therefore the decision to change from the dual mandate, of price stability and full employment, to a single mandate of only inflation needs to be taken there. We believe that the congress should amend the Federal Reserve act to make long-run price stability the primary goal of monetary policy. By doing so, it would still leave room for other goals to the extent that they are consistent with price stability. Low long run inflation is already a priority for the Federal Reserve but, as argued throughout this policy recommendation, a public announcement of this implicit priory would be a useful starting point for making inflation targeting explicit.

6.1 Definition and measurement of the target

Since inflation targeting requires by definition a specific numerical target or a range, it has to be clear how the target is defined and measured. Most inflation targeting regimes target some low but positive inflation since the cost associated with undershooting and having deflation are by most considered graver than the costs of a low steady inflation. As stated earlier, the Federal Reserve has, for example, implicitly been targeting about two percent inflation for an extended period, much in line with the inflation target in Britain and the Euro-zone.

Inflation targeting usually takes the form of a target band, such as a range of 0-2 percent inflation per year, rather than a particular number. The target band is usually a medium-range target, which gives the central bank flexibility in the short run. When choosing the exact target and its definition we believe that choosing an explicit point target, with some space for deviations to either side, or a clear limited target range, is more optimal than only specifying an upper limit to inflation. Choosing only an upper bound like the European Central Bank has done, which targets inflation close to, but below two percent, is very asymmetric and ambiguous as it specifies no lower bound.

This makes the band wide downwards and can give rise to unnecessary uncertainty, for example about the bank's commitment to avoid deflation. As argued by Svensson (2002) having an explicit point target, or a range, is more important than the exact numerical value of the target. The target should be symmetric, giving the same room for deviations in both directions of the point target, thereby avoiding any upward, or downward bias and decreasing uncertainty.

Inflation targeting regimes often include an escape clause, aimed at specifying conditions under which the target may not be achieved. The clause is meant to increase flexibility when the change in price level is truly out of the control of monetary policy. The shocks specified for such a clause to take effect need to be truly exogenous, such as terms of trade shocks, supply shocks or indirect taxes. We do recommend that there will put in place an escape clause in the U.S. inflation targeting regime, but due to the size country and depth of its markets, we stress that such as clause must well specified and should only take effect under very special circumstances.

6.2 Measuring inflation

When setting an inflation target it has to be chosen which measurement of inflation to go by. At the moment the Federal Reserve seems to focus on core PCE inflation, that is, inflation in the prices of consumer goods and services excluding certain volatile sectors, such as food and energy. There is good reason for this approach although at first glance it might seem reasonable to target the consumer price index (CPI), as it is the most prominent and widely available measurement of inflation in the US. It is also constructed by the National Bureau of Labor Statistics, which is independent of the Fed. However the CPI is a fixed-weight index, which measures the movement in the price of a specific consumption good basket. As the price of goods does not change in unison, the CPI is known to overestimate the changes in the cost of living substantially, having nearly a one percent upward bias according to Lebow and Rudd (2003). The choice of the Fed to follow the PCE index is therefore well grounded as it is supposed to be less affected by this upward bias. By similar reasons the Fed only chooses the core of the PCE since the prices of goods like tobacco and alcohol are heavily affected by taxes, and prices of food and energy related goods are subject to weather and geopolitical conditions and therefore tend to fluctuate. For inflation targeting, the relevant inflation to target is the general upward movement in prices, best captured by the core PCE inflation.

6.3 Transparency, Predictability and Accountability

One of the main arguments in favour of inflation targeting is to increase the transparency and predictability of monetary policy. It is therefore both because of the huge impact monetary policy has on society, and also because of how important expectations are to monetary policy, that inflation targeting has to be implemented with democratic accountability. To increase transparency the Fed could, for example, publish a quarterly report where they would explain their strategy. This could, over time, develop an understanding of how monetary policy can be most constructive in terms of real economic growth and stability, through the maintenance of a stable, low inflation environment where private enterprises can flourish. It is crucial to

communicate effectively the forward-looking nature of the target to influence expectations, and also to help the public and markets understand the mechanics of the policy and the rationale of the target.

Making the target explicit will also give a solid benchmark for the Congress, by which to make the Federal Reserve openly accountable for adhering to the target. If inflation falls outside the target range it will increase the accountability of the Fed if they have to explain themselves openly to the Congress, and at the same time to the Congress' constituency, the people. In that situation the Federal Reserve would have to issue a statement explaining why they missed their mark, explaining for example the economics of the unforeseen shock which might be responsible, and further the Chairman of the Fed should be called before the Congress for explanations and questioning. This would increase the incentive for the Fed to be firm on their inflation target and make the Fed's operations more open to both the public and the Congress. The arrangement would be similar to the UK, where if the Bank of England misses the inflation target of two percent by more than one percent to either side, the Governor of the Bank must write an open letter to the Chancellor explaining the reasons why inflation has been outside the range and what the proposed actions of the Bank are to ensure that inflation returns to the target range.

6.4 Flexibility and timing

When considering the trade-off between having a wide band, for the sake of the high uncertainty of inflation outcomes, or making it more narrow so not to get the Fed's commitment under question, we have already ruled out the possibility of strict inflation targeting due to both its practical impossibility as well as the detrimental effect that adherence to it would have on the economy. The Fed should therefore go for flexible inflation targeting, but then the question becomes how flexible it should be.

When countries are adopting inflation targeting after a long period of volatile inflation it becomes more important to be stricter than otherwise in your inflation targeting to be able to bring inflation expectations down. Here the US has an advantage as inflation expectations have been stable for a long time and even now after the recent crisis the spread between regular government bonds and price indexed government bonds is very close to two percent. There is therefore room for the Federal Reserve to adopt a reasonably flexible inflation target. As it is thought that within two years most of the effect of a change in interest rates materializes in the rate of inflation, we think it would be appropriate for the US to take up a two year time horizon for its inflation targeting. By doing so they would be following the precedent of many other developed inflation targeting regimes and it would allow for considerable flexibility in the short run while still keeping the target credible.

6.5 The current political appeal

In recent years, many bills proposing the adoption of inflation targeting have been put forth in the Congress. None of these have made any real headway, and instead have been cleared from the books at the end of each session, as all proposed bills and resolutions have not passed. After decades of low and steady inflation, there seems

to be little interest in a proposal to dramatically change the Federal Reserve's mandate.

It does not sound all that appealing to people with little knowledge of economics, or even more specifically little knowledge of monetary policy, that employment will no longer be one of the official mandates of the Fed. Even though employment is likely to be higher, and more stable under such a regime, it may still sound to the majority of the public as if the authorities want to put employment in the backseat, as if their focus is more on the money than the people. Since it might therefore prove difficult to convince many of the members of the Congress of such a change, it might prove even harder for the Congressmen to convince their constituency of such a deal. For these very basic reasons it is obviously a hard political issue to get a change to a single mandate through a democratic Congress, especially now when the monetary results of the last decades seem at very least to have been adequate, at least with regards to inflation.

This concern, as well as the one about the Fed's diminishing independence following the proposed change, would in our opinion be best met through the channel of information. With a well-known proponent of inflation targeting as the current Chairman of the Fed, the best way would be to get the Fed to take initiative. As suggested by McCallum (2003) the Fed could begin by unilaterally publishing a quarterly report like many inflation targeting countries do, where it would explain this monetary strategy. This would develop over time into an understanding of how monetary policy can be most constructive through inflation targeting and reduce the current misconceptions about the regime.

7. Conclusion

We believe that the case for the adoption of Inflation Targeting in the United States is a very strong one. As we have argued throughout the Memo, this monetary policy framework has numerous appealing features. It has been demonstrated both theoretically and empirically to be a reliable and flexible regime that allows improvement of the trade-off between inflation and output. For a country like the US, the adoption of Inflation Targeting would mean the institutionalization of a practice that has been implicitly implemented ever since Paul Volcker took office in 1979 and has yielded excellent outcomes.

The foundation of our support for Inflation Targeting is based on three fundamental pillars. First of all we want to be realistic. We propose that the Fed controls inflation in the medium/long run and attempts to smooth the business cycle in the short run, to the extent that is possible through monetary policy. Secondly, we want the Fed to be efficient. Inflation Targeting has been adopted by more and more countries around the world and, as the evidence accumulates, the conviction that this regime is both effective and efficient becomes stronger. The fact that no country in the world has abandoned this framework, indicates widespread satisfaction with its outcomes. Finally, we believe that the Federal Reserve should be made accountable for the outcomes of its policies. By all means the Fed should remain as independent as possible, but in a democratic society, an institution with such influence on economic outcomes should be given a precise mandate by which it is held responsible.

We have presented a compelling case for inflation targeting and pointed out, why the arguments raised against a single mandate are neither convincing nor relevant. Nevertheless, inflation targeting has not been adopted so far and, according to recent comments from the Fed, there is no reason to believe that Inflation Targeting will be adopted in the near future. Our impression is that this stance is based more on political motives rather than economic rationale. The popular resistance to prioritize inflation over unemployment is understandably high, especially during times of crises. In order to overcome these fears and minimize misconceptions, the Fed could take the initiative and start introducing some aspects of Inflation targeting before it is made explicit by the Congress. To sum up, we strongly recommend that the US congress amends the Federal Reserve Act, making inflation the primary goal of monetary policy.

References

- Albagli, E., and K. Schmidt-Hebbel. 2005. "By How Much and Why Do Inflation Targeters Miss Their Targets?" Santiago: Central Bank of Chile.
- Andolfatto David and Paul Gomme, "Monetary Policy Regimes and Beliefs," Federal Reserve Bank of Cleveland, Working Paper no. 99- 05.
- Ball L. and Niamh Sheridan, 2003. "Does inflation targeting matter?," DNB Staff Reports (discontinued) 118, Netherlands Central Bank.
- Barro, Robert J. & Gordon, David B., 1983. "Rules, discretion and reputation in a model of monetary policy," *Journal of Monetary Economics*, Elsevier, vol. 12(1), pages 101-121.
- Bernanke Ben S. & Michael Woodford, 2004. "The Inflation-Targeting Debate," NBER Books, National Bureau of Economic Research, Inc, number bern04-1.
- Bernanke, Ben S., T. Laubach, F.S. Mishkin, 1999, and A.S. Posen, "Inflation Targeting: Lessons from the International Experience", Princeton: Princeton University Press
- Bernanke, Ben S., and F.S .Mishkin, 1997. "Inflation targeting: A New Framework for Monetary Policy?" *Journal of Economic Perspectives*, 11 (2) (Spring 1997), 97 - 116.
- Buiter, W., 2009, "The Unfortunate Uselessness of Most 'State of the Art' Academic Monetary Economics," in <http://www.voxeu.org/index.php?q=node/3210>
- Buiter, Willhem Hendrik, 2006 "Rethinking inflation targeting and Central Bank independence, Background paper for an Inaugural Lecture for the Chair of European Political Economy in the European Institute at the London School of Economics and Political Science, given on Thursday, 26th October 2006, at 18:30, in the Old Theatre, London School of Economics and Political Science <http://www.nber.org/~wbuiter/inaug.pdf>
- Carvalho A. & Carlos Eduardo S. Gonçalves, 2009. "Inflation Targeting Matters: Evidence from OECD Economies' Sacrifice Ratios," *Journal of Money, Credit and Banking*, Blackwell Publishing, vol. 41(1), pages 233-243, 02.
- Carvalho Filho Irineu, 2010. "Inflation Targeting and the Crisis: An Empirical Assessment," MPRA Paper 19960, University Library of Munich, Germany.
- Cecchetti S. G. and Michael Ehrmann, 2002. "Does Inflation Targeting Increase Output Volatility?: An International Comparison of Policymakers' Preferences and Outcomes," *Central Banking, Analysis, and Economic Policies Book Series*, in: Norman Loayza & Klaus Schmidt-Hebbel & Norman Loayza (Series Editor) & Klaus Schmidt-Hebbel (Series (ed.)), *Monetary Policy: Rules and Transmission Mechanisms*, edition 1, volume 4, chapter 9, pages 247-274 Central Bank of Chile.
- Chatterjee, Satyajit, 2002."The Taylor curve and the unemployment-inflation tradeoff," *Business Review*, Federal Reserve Bank of Philadelphia, issue Q3, pages 26-33.
- Clarida Richard, Jordi Gali and Mark Gertler, 1998. "Monetary Policy Rules and Macroeconomic Stability: Evidence and Some Theory," NBER Working Papers 6442, National Bureau of Economic Research, Inc.
- Clarida Richard and Jordi Galí and Mark Gertler, 1997. "The Science of Monetary Policy: A New Keynesian Perspective", *Economics Working Papers* 356, Department of Economics and Business, Universitat Pompeu Fabra, revised April 1999.

Creel, Jerome and Hubert, Paul, "Has the Adoption of Inflation Targeting Represented a Regime Switch? Empirical Evidence from Canada, Sweden and the UK" (November 17, 2008). Available at SSRN: <http://ssrn.com/abstract=1302866>

Fischer Stanley and Franco Modigliani, 1980. "Towards An Understanding of the Real Effects and Costs of Inflation," NBER Working Papers 0303, National Bureau of Economic Research, Inc.

Friedman Benjamin M., 2004. "Why the Federal Reserve Should Not Adopt Inflation Targeting", International Finance, Blackwell Publishing, vol. 7(1).

Friedman, Benjamin M., 1990. "Targets and instruments of monetary policy," Handbook of Monetary Economics, in: B. M. Friedman & F. H. Hahn (ed.), Handbook of Monetary Economics, edition 1, volume 2, chapter 22, pages 1185-1230 Elsevier.

Friedman, Milton, 1961. "The Lag in Effect of Monetary Policy," Journal of Political Economy, University of Chicago Press, vol. 69, pages 447.

Gali J.; and Mark Gertler, 2007. "Macroeconomic Modeling for Monetary Policy Evaluation," Journal of Economic Perspectives, American Economic Association, vol. 21(4), pages 25-46, Fall.

Gordon Robert J., 1986. "Supply Shocks and Monetary Policy Revisited," NBER Working Papers 1301, National Bureau of Economic Research, Inc.

FEDERAL RESERVE BANK OF ST. LOUIS R E V I E W: Inflation Targeting:Prospects and Problems

Goodfriend M., 2003. "Inflation Targeting in the United States?," NBER Working Papers 9981, National Bureau of Economic Research, Inc.

Hu Y., 2003. "Empirical Investigations of Inflation Targeting," Peterson Institute Working Paper Series WP03-6, Peterson Institute for International Economics.

Joint Economic Committee, 2004. "Price Stability and Inflation Targets: A Legislative History", United States Congress, <http://www.house.gov/jec/fed/07-14-04.pdf>

Kuttner, Kenneth N., 2005. "Edwin M. Truman, Inflation Targeting in the World Economy, Institute for International Economics (2003)," Journal of International Economics, Elsevier, vol. 67(1), pages 259-262, September.

Kydland, Finn E & Prescott, Edward C, 1977. "Rules Rather Than Discretion: The Inconsistency of Optimal Plans," Journal of Political Economy, University of Chicago Press, vol. 85(3), pages 473-91, June.

Lalonde R. and Nicolas Parent, 2006. "The Federal Reserve's Dual Mandate: A Time-Varying Monetary Policy Priority Index for the United States," Working Papers 06-11, Bank of Canada.

Laubach T. and Adam Posen, 1997. "Some comparative evidence on the effectiveness of inflation targeting," Research Paper 9714, Federal Reserve Bank of New York.

Lebow, David, and Jeremy Rudd. 2003. "Measurement Error in the Consumer Price Index: Where Do We Stand?" Journal of Economic Literature 41(1, March), pp. 159–201.

Levin, A., F. M. Natalucci, and J. M. Piger. 2004. "The Macroeconomic Effects of Inflation

Targeting." *Federal Reserve Bank of St. Louis Review* (July): 51–80

McCallum Bennett T., 2007. "Inflation Targeting for the United States?" *Cato Journal*, Vol. 27, No. 2, Cato Institute.

Mishkin F. S., 2008. "Does Stabilizing Inflation Contribute To Stabilizing Economic Activity?," NBER Working Papers 13970, National Bureau of Economic Research, Inc.

Mishkin F. S. and Klaus Schmidt-Hebbel, 2006. "Does Inflation Targeting Make a Difference?," Working Papers Central Bank of Chile 404, Central Bank of Chile.

Mishkin F. S., 2004. "Why the Federal Reserve Should Adopt Inflation Targeting," *International Finance*, Blackwell Publishing, vol. 7(1), pages 117-127, 03.

Frederic S. Mishkin, 2001. "INFLATION TARGETING" Graduate School of Business, Columbia University and National Bureau of Economic Research.

Neumann M.J.M and Jürgen von Hagen, 2002. "Does inflation targeting matter?," *Review*, Federal Reserve Bank of St. Louis, issue Jul, pages 127-148.

Orphanides, Athanasios and Williams, John C., Inflation Scars and Forecast-Based Monetary Policy (July 2003). FEDS Working Paper No. 2003-41

Otto G. and Graham Voss, 2009. "Strict and Flexible Inflation Forecast Targets: An Empirical Investigation," Department Discussion Papers 0902, Department of Economics, University of Victoria.

Posen, Adam. S., 1997. "Design issues in the implementation of inflation targets. (Part II)" Federal Reserve Bank of New York Economic Policy Review.

Roger S. and Mark R. Stone, 2005. "On Target? The International Experience with Achieving Inflation Targets," IMF Working Papers 05/163, International Monetary Fund.

Schwartz, Anna J. and Todd, Walker F., 2008. "Why a Dual Mandate is Wrong for Monetary Policy," *International Finance*, Blackwell Publishing, vol. 11(2), pages 167-183, 08.

Sims, Christopher, 2005. "Limits to Inflation Targeting." In *The Inflation Targeting Debate*, edited by B. S. Bernanke and M. Woodford, 283–308. University of Chicago Press for the National Bureau of Economic Research.

Svensson, Lars E. O., 2002. "Inflation Targeting: Should It Be Modeled as an Instrument Rule or a Targeting Rule?," NBER Working Papers 8925, National Bureau of Economic Research, Inc.

Svensson Lars E. O., 1997. "Inflation targeting in an open economy: strict or flexible inflation targeting?," Reserve Bank of New Zealand Discussion Paper Series G97/8, Reserve Bank of New Zealand.

Svensson, Lars E. O., 1997. A Inflation Forecast Targeting: Implementing and Monitoring Inflation Targets, @ *European Economic Review*, 41,: 1111-1146.

Taylor, John B., 1993. "Discretion versus policy rules in practice," Carnegie-Rochester Conference Series on Public Policy, Elsevier, vol. 39(1), pages 195-214, December.

Thorbecke Willem, 2002. "A Dual Mandate for the Federal Reserve, The Pursuit of Price Stability and Full Employment," Economics Public Policy Brief Archive 60, Levy Economics Institute,

Truman E. M., 2003. "Inflation Targeting and the Group of Three" in Inflation Targeting in the World Economy, INSTITUTE FOR INTERNATIONAL ECONOMICS 1750 Massachusetts Avenue, NW, Washington, DC

Thomas F. Cooley and Gary D. Hansen, "The Inflation Tax in a Real Business Cycle Model," American Economic Review, vol. 79, no. 4 (1989), pp. 733–48

Wascher W. and Palle S. Andersen, 1999. "Sacrifice ratios and the conduct of monetary policy in conditions of low inflation". BIS Working Papers 82, Bank for International Settlements.

White, William R. (2006), "Is Price Stability Enough?", BIS Working Paper No. 205, www.bis.org